

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



REC'D 11 MAR 2004

WIPO PCT

Applicant's or agent's file reference IP/P7151/WOD	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/02720	International filing date (day/month/year) 26.06.2003	Priority date (day/month/year) 28.06.2002
International Patent Classification (IPC) or both national classification and IPC C09K19/34		
Applicant QINETIQ LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 27.11.2003	Date of completion of this report 10.03.2004
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Jardon Alvarez, J Telephone No. +49 89 2399-8325 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/02720**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-64 as originally filed

Claims, Numbers

1-9 as originally filed

Drawings, Sheets

1/14-14/14 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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International application No. **PCT/GB 03/02720**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-9
	No: Claims	
Inventive step (IS)	Yes: Claims	1-9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The subject-matter of the claims fulfils the requirements of Article 33(2)-(4) PCT.
- 1.1. None of the documents cited in the Search Report discloses a material given by Formula I and Ib as defined in claim 1 of the present application.

Diarylethene photochromic compounds are already well known and disclosed in all the documents cited in the Search Report. The compounds now claimed differ from said compounds by the presence of a substituent of the formula II **including a mesogenic group attached to the aryl substituent by a -Y-Q- bridge**. Such -Y-Q-bridge, wherein Q is selected from $(CH_2)_n$ or $CH_2)_m[Si(L_2-O)_q-Si(L_2)-CH_2)_p-$, is not present in none of the compounds disclosed in the available prior art.

The subject-matter of the claims is then novel (Art. 33(2) PCT).

- 1.2. The subject-matter of the claims is also based on an inventive step (Art. 33(3) PCT).

As pointed out above diarylethene photochromic compounds and its use in electro-optic devices is already well known (see documents cited in the Search Report, for instance US - 6 359 150, D1, claims and examples).

The problem to be solved by the present application can then be seen as to provide further compounds also useful for electro-optic devices. This problem is solved by the compounds of claim 1 having the basic structure of the known compounds **combined** with a liquid crystal material (see claim 1, at least one of a, b, c, d, e, f being selected from Formula II). These compounds show good optical stability, low writing energy density, high number of read/write cycles, etc. (see examples; see also page 22) and are therefore useful for liquid crystal devices.

There is no suggestion in the available prior art to these compounds and therefore an inventive step is acknowledged (Article 33(3) PCT).